

USDA Mushroom Quality Research Project Shows Progress

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Last May there was a meeting at the Eastern Regional Research Center (ERRC) of the United States Department of Agriculture (USDA) in Philadelphia which included a number of mushroom companies who have been financially supporting research work on mushroom quality. In an effort to keep the industry up-to-date Dr. Gerald Sapers, one of the researchers on this project, reported on ERRC's findings. Collaborating with Dr. Sapers on this project were USDA Scientists Sang-Won Choi, Robert L. Miller and John M. Wells.

History of Mushroom Quality Research Project

Since 1985, the Eastern Regional Research Center (ERRC), a part of the USDA's Agricultural Research Service located in Philadelphia, has carried on an active program of research on controlling browning in minimally processed (fresh-cut) fruits and vegetables, including apples, pears, potatoes, and mushrooms. In September 1990, Dr. Frederick C. Miller, Director of Research and Development at Sylvan Foods, Inc., contacted ERRC scientists about the possibility of applying this research to the improvement of washed mushroom quality and shelf-life. Over the next several months, a research proposal was developed to address Dr. Miller's concerns. The research would be carried out under a Cooperative Research and Development Agreement (CRADA) between the Agricultural Research Service and Sylvan Foods and would be funded by this company.

During the winter of 1991-92, the CRADA was expanded to include four other mushroom producers who wished to participate in research on quality and shelf-life improvement. At the same time, the scope of the project was broadened to include unwashed mushrooms as well as washed. The amended CRADA, which was approved in March 1992, provided funding for one year, with the option to continue the project for a second year. Participating companies include Franklin Mushroom Farms; Highline Produce, Ltd.; J-M Farms, Inc.; Sylvan Foods, Inc.; and Wilson Mushroom Company. Later in 1992, these companies were joined by the Campbell Soup Company.

Preliminary studies were initiated by Dr. Gerald M. Sapers and other ERRC scientists in July 1991, to better define the problem and identify key parameters. In February 1992, Dr. Sang-Won Choi, a Korean food scientist with experience in the study of browning reactions in mushrooms and in natural products chemistry, was hired to work full-time on the new project. He collaborates with Dr. Sapers, the project leader, in research on the causes and control of the mushroom defects. To assist him in his research, Dr. Choi has at his disposal the full scientific resources of ERRC, including expertise in microbiology, microscopy, chemistry, and food technology.

Research Objectives

Research carried out under the expanded CRADA has three primary objectives:

1. Determination of the cause of lesion formation in washed mushrooms, and prevention of lesion occurrence.
2. Determination of the chemical basis of discolorations associated with washing of mushrooms, and inhibition of discoloration reactions.
3. Identification of environmental and production factors that increase the tendency of washed or unwashed mushrooms to brown during storage, and development of strategies to reduce this tendency without the use of additives.

Studies carried out under the CRADA are complemented by ongoing research on minimally processed mushrooms, funded by the Agricultural Research Service, which has as its objectives:

1. Development of treatments to clean and sterilize whole or sliced mushrooms.
2. Development of treatments to control browning and bacterial spoilage in fresh mushroom slices and to control browning and leakage during thawing of frozen slices.

Mushroom Research Workshops

To launch the new project, a mushroom research workshop was held at ERRC on May 13, 1992, attended by CRADA participants, ERRC scientific staff, and representatives of the Pennsylvania State University and the American Mushroom Institute. Attendees at this workshop met with ERRC scientists, toured the facility, reviewed CRADA research plans and preliminary results, and discussed research needs of the mushroom industry (See Mushroom News, pp. 26-27, September 1992.).

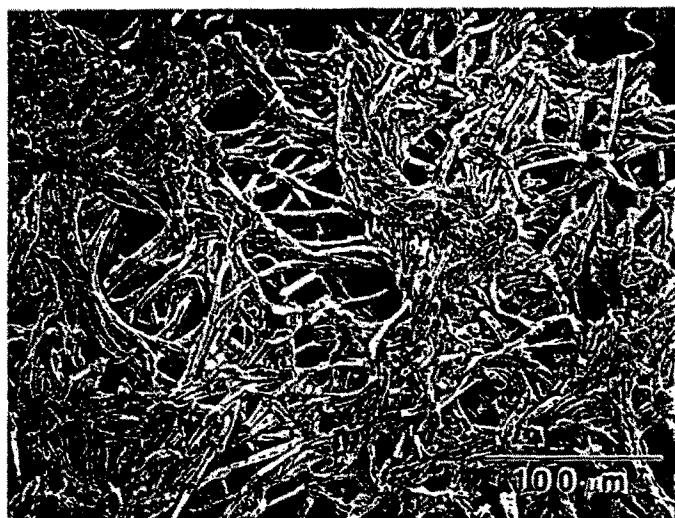
A second workshop was convened at ERRC on May 6, 1993, to review research progress and consider future options for the project.

Future Plans

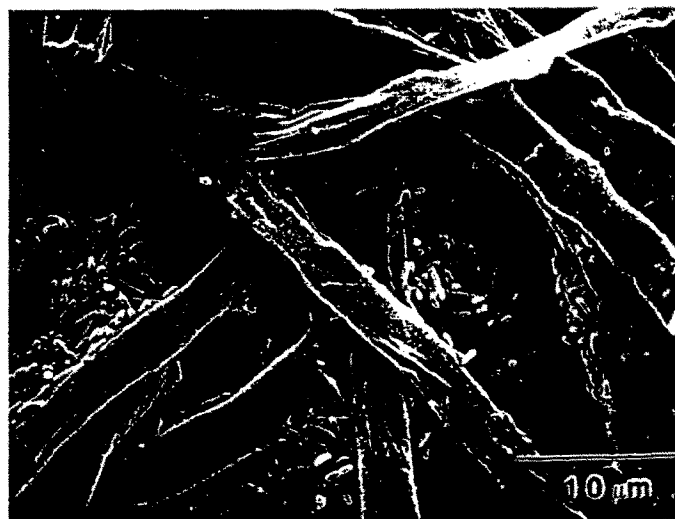
During the second year of the project, a field test of promising treatments to control post-harvest quality defects in washed mushrooms is planned. Research on the microbiology of washed mushrooms, surface sterilization, and novel methods of cleaning mushrooms will be continued. Research on the relationship between mushroom browning and casing or compost composition also will be continued. Studies carried out under the CRADA are only funded for the first half of 1993. Since some aspects of the research, if carried to completion, would require longer term support than can be provided by the CRADA, it's hoped that the mushroom industry will provide additional funding so that work on quality improvement and shelf-life extension at ERRC can continue. By this research and the ongoing development of technology to produce value-added, minimally processed mushrooms, the ERRC program can have a positive impact on the success of the U.S. mushroom industry.

Conclusion

The companies who are funding this effort were encouraged by the results. However, the group agreed that efforts should be made to secure greater participation by more of the industry and that attempts should be made through appropriate government agencies and the Congress to see if government money could also be used to support this research. MN



Scanning electron micrograph of hyphae in lesion on surface of washed mushroom, showing presence of bacteria (X 2500).



Scanning electron micrograph of surface of washed mushroom, showing disruption and aggregation of hyphae (X 250).